

WHAT IS CLAIMED IS:

1        1.        A method of providing minimal power consuming redundant computing elements for  
2        a distributed application comprised of a plurality of components, wherein the plurality of  
3        components are hosted by a plurality of computing elements that can each enter a power  
4        saving mode, the method comprising:

5                detecting an impending or actual failure of an affected computing element;  
6                identifying instances of components executing on the affected computing element;  
7                signaling a cold spare computing element to enter a normal operation mode from the  
8                power saving mode; and  
9                initializing instances of identified components on the cold spare computing element  
10                now operating in normal operation mode.

1        2.        The method of claim 2 and further comprising:  
2                gracefully suspending all instances of identified components, if possible, executing  
3                on the affected computing element; and  
4                signaling the affected computing element to enter a hot swap mode from the normal  
5                operation mode.

1        3.        The method of claim 3 and further comprising:  
2                replacing the affected computing element with a replacement computing element;  
3                signaling the replacement computing element to enter the normal operation mode  
4                from the hot swap mode;  
5                initializing instances of identified components on the replacement computing element  
6                now operating in the normal operation mode;  
7                gracefully suspending all instances of identified components on the cold spare  
8                computing element; and  
9                signaling the cold spare computing element to enter the power saving mode from the  
10                normal operation mode.

1       4.     A computer program product comprising:  
2       at least one computer usable medium having computer readable code embodied  
3       therein for providing availability of minimal power consuming redundant  
4       computing elements for a distributed application comprised of a plurality of  
5       components, wherein the plurality of components are hosted by a plurality of  
6       computing elements that can each enter a power saving mode, the computer  
7       program product including:  
8       first computer readable program code devices configured to detect an impending  
9       or actual failure of an affected computing element;  
10       second computer readable program code devices configured to identify instances  
11       of components executing on the affected computing element;  
12       third computer readable program code devices configured to signal a cold spare  
13       computing element to enter a normal operation mode from the power  
14       saving mode; and  
15       fourth computer readable program code devices configured to initialize instances  
16       of identified components on the cold spare computing element now  
17       operating in the normal operation mode.

1       5.     The computer program product of claim 4 further including:  
2       fifth computer readable program code devices configured to gracefully suspend all  
3       instances of identified components, if possible, executing on the affected  
4       computing element; and  
5       sixth computer readable program code devices configured to signal the affected  
6       computing element to enter a hot swap mode from the normal operation mode.

1       6.     The computer program product of claim 5 further including:  
2       seventh computer readable program code devices configured to detect a replacement  
3       of the affected computing element with a replacement computing element;

4 eighth computer readable program code devices configured to signal the replacement  
5 computing element to enter the normal operation mode from the hot swap mode;  
6 ninth computer readable program code devices configured to initialize instances of  
7 identified components on the replacement computing element now operating in  
8 the normal operation mode;  
9 tenth computer readable program code devices configured to gracefully suspend all  
10 instances of identified components on the cold spare computing element; and  
11 eleventh computer readable program code devices configured to signal the cold spare  
12 computing element to enter the power saving mode from the normal operation  
13 mode.

7. A computer system comprising:

14 a backplane;  
15 a plurality of host processor cards coupled to the backplane, with the plurality of host  
16 processor cards hosting a distributed application comprised of a plurality of  
components, and at least one of the plurality of cards designated as a cold spare  
host processor card that is normally kept in a power saving mode; and  
a management unit coupled to the back plane, the management unit operable to signal  
each of the plurality of host processor cards to enter the power saving mode and  
a normal operation mode, and executing a program that:  
detects an impending or actual failure of an affected host processor card of the  
plurality of host processor cards;  
identifies instances of components executing on the affected host processor card;  
signals the cold spare host processor card to enter the normal operation mode  
from the power saving mode; and  
initializes instances of identified components on the cold spare host processor  
card now operating in normal operation mode.

1       8.     The computer system of claim 7 wherein the program executing on the management  
2     unit also:

3             gracefully suspends all instances of identified components, if possible, executing on  
4             the affected host processor card; and  
5             signals the affected host processor card to enter a hot swap mode from the normal  
6             operation mode.

1001  
1002  
1003  
1004  
1005  
1006  
1007  
1008  
1009  
1010  
1011  
1012  
9.     The computer system of claim 8 wherein the program executing on the management  
unit also:

1013             detects replacement of the affected host processor card with a replacement host  
1014             processor card;  
1015             signals the replacement host processor card to enter the normal operation mode from  
1016             the hot swap mode;  
1017             initializes instances of identified components on the replacement host processor card  
1018             now operating in the normal operation mode;  
1019             gracefully suspending all instances of identified components on the cold spare  
1020             computing element; and  
1021             signaling the cold spare computing element to enter the power saving mode from the  
1022             normal operation mode.